determined and a result in sight the correctness of which is only limited by the imperfections of the method. Instead, the methods are often conventional, depending upon such factors as the method of preparing the sample or the solvent employed, or they may be determinations like the absorptive power of the soil for water, which have no absolute meaning at all, but are merely attempts in the laboratory to get a number which shall represent the behaviour of the soil in the field. With regard to so many of these determinations of a physical nature the difficulty lies, not in carrying out the process, but in interpreting it afterwards, and correlating it with some practical aspect of the soil. The present volume of Dr. Wiley's book becomes, in consequence, something more than a collection of analytical methods; it is in many respects a treatise on soil chemistry and soil physics, so full are the introductory discussions dealing with each of the various means of investigating the soil, and as such it is indispensable to all serious students of agricultural chemistry.

Dr. Wiley has cut out some of the matter of the earlier edition, though retaining processes which have a historical interest or are necessary in tracing the development of the more modern method; he has further incorporated methods and investigations which have been published in the twelve years that have elapsed since the appearance of the first edition. The present volume is dated October, 1906; we miss, however, one or two methods which appeared before that date, *e.g.* Mitscherlich's interesting determination of the heat evolved when a soil is moistened (benetzungwärme), which is correlated with the active surface of the soil particles. In one or two other respects also we think later work might have modified some of the conclusions expressed, but of course the subject is in a constant state of progress, and the time occupied in writing a book of this magnitude is sufficient to bring about a revision of some of the points of view. We notice, indeed, but scant reference to the more recent developments in soil investigation which have issued from the Division of Soils in the United States Department of Agriculture; perhaps we may take this negative attitude of Dr. Wiley's as a critical one.

In conclusion, we can only express our thanks for what must always be one of the most useful books in the library of any agricultural laboratory.

A. D. H.

OUR BOOK SHELF.

Introduction to the Theory of Fourier's Series and Integrals and the Mathematical Theory of the Conduction of Heat. By H. S. Carslaw. Pp. xvii + 434. (London: Macmillan and Co., Ltd.) Price 14*s.* net.

THIS book is an interesting sign of the times. The gulf between pure and applied mathematics, in this country at any rate, has of recent years become more and more complete. Indeed there is no one who so heartily detests and despises mathematics proper as the ordinary physicist. He is often compelled to use elaborate mathematical analysis, but he does not feel or profess any interest in anything but the result, and questions as to the mathematical basis of his arguments seem to him merely trifling and vexatious.

Prof. Carslaw has therefore shown a good deal of courage in offering to English readers a book on the theory of conduction of heat which includes a serious account of the mathematical difficulties of the theory and may expose him to unsympathetic criticism from different points of view which have little in common. However, the experiment is a distinct success, and it is to be hoped that it will lead to similar and equally successful experiments with other and more difficult branches of mathematical physics.

The book is divided into two parts. Part i. is entirely mathematical, and it is this part which contains most that is novel in an English book and is, therefore, most interesting to the critic. A short but well-written historical introduction is an attractive feature. In the first two chapters, which deal with irrational numbers and infinite sequences in general, the author mostly follows Dedekind and Tannery, and he could not have chosen better guides. The chapters on uniform convergence are also good, though here the arrangement and method of presentation do not seem to us in every respect the best. The author, we are glad to see, speaks of "*infinite* definite integrals," and discards the barbarous "improper." He might perhaps have brought out more clearly the fact that the infinite integral is essentially a repeated limit—as it is, he rather exaggerates the analogy between the integral and the infinite series; and it is a pity that he should have omitted to prove the fundamental inversion theorems for finite integrals. But the chapters dealing especially with Fourier's series seem to us the best; we are particularly glad to see Fejér's theorem included. Part ii. contains a clear account of the principal problems of conduction, and requires no special comment here.

This book shows very clearly how much of the Continental spirit of rigour English mathematics has absorbed in recent years. It also shows how much the heaviness of the Continental δ and ϵ can be lightened by a bright and attractive style, interesting illustrations, numerous examples, and other touches of the Cambridge tradition.

G. H. H.

Museu Paraense de Historia e Ethnographia: Arboretum Amazonicum. By Dr. J. Huber. Pp. 40; with 40 plates. Decades i. to iv. (Para, 1900 and 1906.)

FOR a development of moist equatorial vegetation no region surpasses that bordering the Amazon and its tributaries, which Dr. Huber, in the course of his long association with Para, has had unique opportunities of visiting. The form in which Dr. Huber presents his information is similar to the "Vegetationsbilder," where the illustrations are the chief feature and the notes are explanatory thereto, but it should be stated that the first two parts of the "Arboretum Amazonicum" were issued in 1900, previous to the first numbers of the "Vegetationsbilder." Two additional parts appeared last year, and it is proposed to complete the work in ten numbers. The publication of the work has been undertaken by the Polygraphisches Institut of Zürich, and the photogravures afford a criterion of the excellence of their work.

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Palms generally rank among the most important tropical plants, and along the Amazon and its tributaries, especially near the embouchure, they form such prominent objects in the landscape that all voyagers make special mention of their luxuriance and variety. Dr. Huber devotes a number of plates to different species. *Phytelephas microcarpa,* that yields vegetable ivory, the Tucuma and Mumbaca palms, both species of Astrocaryum, the Javary, another species of the same genus, bearing spines on the young trunks, and the Bussu, *Manicaria saccifera*, producing huge, almost entire, leaves, are illustrated in the first two parts. No less interesting are *Cocos inajas*, with pinnæ arranged in bundles on the leaves, the Baccaba or wine-palm, *Oenocarpus distichus,* remarkable for the distichous arrangement of the leaves, and the Urucury, *Attalea excelsa,* which provides the *Seringueiro*, or rubber collector, with nuts used in smoking the rubber. Of trees other than palms, the famous Para rubber tree, *Hevea brasiliensis, Dipteryx odorata*, the source of the Tonca bean of commerce, *Bertholletic excelsa*, the superb tree yielding brazil-nuts, and the magnificent *Caryocar villosum* are selected for representation.

Dr. Huber has also chosen some illustrations of typical plant formations, including the littoral vegetation on the river Couany, where the Aninga, *Montrichardia aborescens*, is growing on the shore; scenes from some of the tidal creeks or channels known as "igarapés"; plant formations occurring in inundated localities, showing in one case a fine development of *Ipomoea fistulosa*, in another a wide expanse of *Panicum amplexicaule*; and a view of an Indian plantation with manioc and sugar-cane in the foreground, and the characteristic Imbauba, *Cecropia peltata*, beyond.

The illustrations are admirable, owing to the care that has been exercised in selecting fine specimens and suitable situations from which the characteristic features of the plants can be brought into the photographs.

Cams, and the Principles of their Construction. By George Jepson. Pp. 60. (New York: D. van Nostrand Co.) Price 8*s*. net.

In this work examples are given of the design of cams of various types, including cylindrical, conical, face, and spherical cams, and of different degrees of complexity, from the simple heart-shaped cam employed in winding bobbins to the writing cam with the differential motions of paper and style. The illustrative drawings are accurately and beautifully executed, the construction lines being printed in red ink for the sake of extra clearness. It is shown how to design the profile of a cam so as to give a simple harmonic motion or a uniform acceleration and retardation to the follower, thereby effecting a change of position of the latter with a minimum wear and tear. The book is a welcome addition to the somewhat scanty literature on the subject.

Rivetage. By M. Fricker. Pp. 168. (Paris: Gauthier-Villars and Masson et Cie., n.d.)

This little volume belongs to the "Encyclopédie scientifique des Aide-mémoire" series, to which attention has often been directed in these columns. It is divided into two parts; the first passes in review the rules—for the most part empirical—which are adopted in determining the dimensions of rivets and in riveting generally, and the second describes the methods which are employed in the actual processes of riveting.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

A New Mud-Volcano Island.

Admiral Field's letter in Nature of February 28, embodying Commander Beauchamp's description of a new island recently discovered by him about nine miles north-west of Cheduba (not Chebuda) Island, off the coast of Arakan, leaves no room for doubt that the island in question was due to the eruption of a submarine mud volcano.

Ramri and Cheduba, together with the adjacent subordinate islands, are composed mainly of shale and sandstone (probably of Tertiary age), containing some coal, and also very considerable quantities of petroleum, accompanied by inflammable gas. There is evidence of a certain degree of abnormal subterranean heat, although such is far lower than that associated with true volcanoes, which do not exist, nor have any volcanic rocks been observed. Mud volcanoes are fairly numerous, which, besides emissions of a quieter character, are subject, at uncertain intervals, to violent paroxysmal eruptions. At such times mud and stones are shot out with great force and noise, accompanied by large quantities of inflammable gas, which in many cases catches fire, and gives rise to a volume of flame that lights up the country for miles around. There are numerous well-authenticated descriptions of such occurrences, more than one of which were submarine. The stones ejected are all derived from the stratified rocks mentioned above, the shales furnishing the source of the mud. Electric sparks, produced by the friction of the ejecta amongst themselves, probably cause the ignition of the gas. Some of the recorded paroxysms were synchronous with earthquakes.

A somewhat detailed account of the mud volcanoes may be found in the "Records of the Geological Survey of India," vol. xi. (1878), pp. 188–207, and descriptions of several later eruptions in subsequent volumes.

Ealing. F. R. Mallet.

A New Chemical Test for Strength in Wheat.

The principle of the test for strength in wheat flour described as new by Mr. T. B. Wood in a recent issue of Nature (February 21), and further claimed by Dr. E. Frankland Armstrong (Nature, March 7) as having been in regular use in his laboratory during the past year, was employed by me more than four years ago, and still forms an important factor in my physicochemical method of gauging the baking qualities of wheat flour.

I can fully corroborate Mr. Wood's opinion that no single factor is capable of measuring the strength value of wheat, and Dr. Armstrong's statement that the problem is one in which no small number of variables must be dealt with.

In 1905 Mr. A. E. Humphries supplied me with five samples as tests of the accuracy of my system as then elaborated. I was, however, not successful; but, on receiving Mr. Humphries' views of their baking qualities, the cause of my failure was at once apparent. When investigating the relation of chemical composition to baking qualities, I had relied for the latter data upon loaves baked in tins, whilst Mr. Humphries based his opinions upon self-supporting loaves of the "cottage" type. It thus became evident that it was necessary to view the analytical data from a standpoint suited to a definite system or method of baking. That different systems of baking require different types of flour explains why millers occasionally receive both commendatory and condemnatory remarks from their customers on the quality of the same blend of flours.

I hope soon to have an opportunity of publishing some of the results of my investigations of the correlated factors determining the blending qualities, strength, and texture properties of wheat flour.

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